REMARKS

Reconsideration of this application, as amended, is respectfully requested.

The December 16, 2002 Office Action and the Examiner's comments have been carefully considered. In response, the specification and claims are amended, corrected formal drawings are submitted, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

DRAWINGS

The Examiner's indication that the proposed drawing correction has been approved is acknowledged and appreciated. Submitted concurrently herewith is a letter to the Official Draftperson submitting corrected formal drawings for Figs. 1, 4A and 6A. It is respectfully submitted that all drawing requirements have been met and that no additional drawings are due in connection with this application.

REJECTION UNDER 35 USC 112

In the Office Action, claim 12 is rejected under the first paragraph of 35 USC 112 as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at

the time the application was filed, had possession of the claimed invention. In response, applicant respectfully directs the Examiner to Figs. 5 and 6 and the corresponding description at page 11, line 19 to page 12, line 20, which includes a description of the second embodiment of the invention which provides support for the invention defined by claim 4. As can be seen from the figures, pulse generator 45 generates pulse signals (more than one, as can be seen from Fig. 6E), each of which has a frequency f_p, in synchronism with trigger signal 38 provided by delay circuit 37. A/D converter 27 executes sampling of the signal in synchronism with the pulse signals. As a result of the above-mentioned discussion in the specification, it is clear that a description of the invention defined by claim 4 is present in the application and shows that applicant had possession of the claimed invention at the time the present application was filed. In view of the foregoing, reconsideration and withdrawal of the rejection of claim 4 under the first paragraph of 35 USC 112 are respectfully requested.

Claim 4 is also rejected under the second paragraph of 35 USC 112. In response, claim 4 is amended in a sincere effort to obviate the indefiniteness rejection. In view of the amendment of claim 4, reconsideration and withdrawal of the rejection under the second paragraph of 35 USC 112 are respectfully requested.

PRIOR ART REJECTIONS

In the Office Action, claims 1-5, 7-9, 11, 12 and 14 are rejected under 35 USC 102(b) as being anticipated by USP 5,866,911 (Baer). Claims 6, 10, 13 and 15 are rejected under 35 USC 103 as being unpatentable over Baer in view of USP 5,523,573 (Hanninen et al.).

In response, claim 1 is amended and claims 8-11 are canceled without prejudice. Claim 12 is amended to place the claim in better form for allowance. The amendments to claim 12 are not related to patentability.

The present claimed invention as defined by amended claim 1 is directed to a laser scanning microscope including a pulse laser oscillator configured to oscillate a pulse laser beam to excite a sample, a scanning mirror configured to scan the pulse laser beam, a photodetector configured to detect light from the sample and output an electric signal, a pulse generator configured to generate pulses on the basis of the oscillation of the pulse laser beam, a sampling circuit configured to sample the electric signal in synchronism with each pulse generated by the pulse generator, and a memory configured to accumulate data output by the sampling circuit.

Baer teach a scanned optical system such as a confocal laser microscope wherein a beam of light is focused to a spot in a

specimen to excite a fluorescent species or other excitable species located at the spot. The effective size of the excitation is made smaller than the size of the spot by providing a beam of light having a wavelength adapted to quench the excitation of the excitable species.

Baer does not, however, disclose, teach or suggest that a detection signal (see Fig. 6B of the present application) generated per oscillation of the pulse laser is sampled using pulse signals (see Fig. 6E of the present application). In the present claimed invention as defined by claim 1, a detection signal generated per oscillation of the pulse laser is sampled using pulse signals and thus, it is possible to detect changes of the detection signal over time. This advantage of the present claimed invention is set forth in the present application at page 11, line 19 to page 12, line 20, *inter alia*.

That is, the present claimed invention as defined by claim 1 is patentable over Baer because Baer does not disclose, teach or suggest, *inter alia* a laser scanning microscope including:

1. a pulse laser oscillator configured to oscillate a pulse laser beam to excite a sample;

2. a pulse generator configured to generate pulses on the basis of the oscillation of the pulse laser beam; and/or

3. a sampling circuit configured to sample the electric signal in synchronism with each pulse generated by the pulse generator.

The other references of record do not close the gap between the present claimed invention as defined by claim 1 and Baer. Therefore, claim 1 is patentable over Baer under 35 USC 102 as well as 35 USC 103.

Independent claim 12 is patentable over Baer for reasons, *inter alia*, set forth above in connection with claim 1.

Dependent claims 2-7 and 13-15, are patentable over Baer in view of their dependence on one of claims 1 and 12.

In view of the foregoing, claims 1-7 and 12-15 are patentable over Baer under 35 USC 102 as well as under 35 USC 103.

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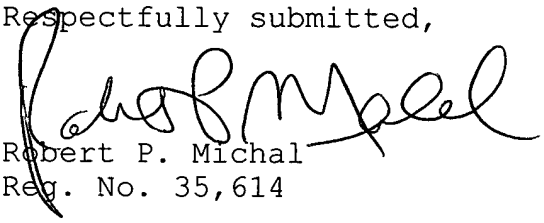
Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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Enc. Copy of amended claims showing changes being made
Copy of pages 11 and 12 of specification showing changes being made thereto.

fluorescent signal.

Moreover, this reliable sampling of the peak of the fluorescent signal enables acquisition of a brighter image than in the case of sampling the fluorescent signal out of synchronism with laser oscillation.

In addition, even when the frequency of emission of fluorescence is low and hence a fluorescent signal is not always generated each time a laser pulse is generated, the fluorescent signal can be acquired efficiently by sampling it in synchronism with laser oscillation.

[Second Embodiment]

Referring then to FIG. 5 and FIGS. 6A - 6F, a second embodiment of the invention will be described. In FIG. 5, elements similar to those in FIG. 2 are denoted by corresponding reference numerals, and are not described in detail.

In this embodiment, a pulse signal output from a pulse generator 45 is used as the sampling clock signal for the A/D converter 27. The pulse generator 45 generates a pulse signal as shown in FIG. 6E in synchronism with the trigger signal 38 output from the delay circuit 37. The frequency fp of the pulse signal and the output period ($\Delta t2$) of each pulse of the pulse signal are set arbitrarily using the external input circuit 39. More specifically, the A/D converter 27

executes sampling, using, as a sampling clock signal, a trigger signal from the delay circuit 37 and executes sampling only within each output period ($\Delta t2$) (see FIG. 6E). Accordingly, the fluorescent signal, which attenuates with time, can be reliably sampled, without missing its peaks, by adjusting the delay time ($\Delta t1$) of the delay circuit 37 and the output period ($\Delta t2$) of each pulse of the pulse generator 45. Moreover, timing adjustment can be executed so that no sampling is executed where no fluorescent signal is generated. For example, when applying the above-described structure to a laser scanning microscope that uses a two-photon process, if sampling is executed one hundred times during the generation of one pulse of a laser beam, the above structure can be used by setting the output period ($\Delta t2$) at 10 ns or less and setting the frequency of the pulse signal of the pulse generator 45 at about 10 GHz, since, in the two-photon process, a laser beam with a pulse frequency of 80 MHz and with a pulse width of 100 fs.

As is evident from the above, a brighter image can be obtained by reliably sampling the fluorescent signal than in the case of executing sampling out of synchronism with laser oscillation. Also, there may be a case where the frequency of emission of fluorescence is low, and hence the fluorescent signal is not always generated each time a laser pulse is generated. Even

COPY OF AMENDED CLAIMS SHOWING CHANGES BEING MADE
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Claims 1 and 12 have been amended as follows:

1. (Twice Amended) A laser scanning microscope comprising:

a pulse laser oscillator configured to oscillate a pulse laser beam to excite a sample;

a scanning mirror configured to scan the pulse laser beam;

a photodetector configured to detect light from the sample and output an electric signal;

a pulse generator configured to generate pulses on the basis of the oscillation of the pulse laser beam,

a sampling circuit configured to sample the electric signal [output from the photodetector] in synchronism with [the oscillation of the] each pulse generated by the pulse generator [laser beam output from the pulse laser oscillator]; and

a memory configured to accumulate data output by the sampling circuit.

4. (Twice Amended) The laser scanning microscope according to claim 3, further comprising a pulse generator configured to generate a pulse signal, whose pulse width is smaller [for starting oscillation and finishing the oscillation in a time period shorter] than the time period of oscillation of [each

interval at which] the pulse laser beam [is oscillated], in synchronism with the synchronous signal delayed by the delay circuit, and wherein the sampling circuit samples the electric signal from the photodetector in response to the pulse signal generated by the pulse generator.

12. (Twice Amended) A laser scanning microscope comprising:

a pulse laser oscillator configured to oscillate a pulse laser beam to excite a sample;

a scanning mirror configured to scan the pulse laser beam;

a photodetector configured to detect light from the sample and output an electric signal;

a laser oscillation synchronous signal generating circuit configured to receive a laser oscillation signal from the pulse laser oscillator and generate a laser oscillation synchronous signal;

a delay circuit configured to delay the laser oscillation synchronous signal output from the laser oscillation synchronous signal generating circuit, and configured to output the delayed signal as a trigger signal;

a pulse generator configured to generate [a pulse signal] pulses in synchronism with the trigger signal output from the delay circuit;

a sampling circuit configured to sample the electric signal output from the photodetector in synchronism with [the] each pulse [signal] output from the pulse generator; and

a memory configured to accumulate data output by the sampling circuit.